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Date: February 11, 1992

Mr. Ken Walker
Environmental Quality Division
Atlantic Division
Naval Facilities Engineering Command
Code: 1822
Norfolk, Virginia 23511-6287

Re: Norfolk Naval Base, Virginia
Review of draft *RI/FS for the Q-Area Drum Storage Yard*

Dear Mr. Walker:

The Environmental Protection Agency (EPA) has performed a cursory review of the draft *RI/FS for the Q-Area Drum Storage Yard* at the Norfolk Naval Base, and our comments are attached. If you have any questions regarding our review of the *RI/FS* documents, please feel free to call me at the telephone number listed above,

Sincerely,

Robert Thomson

Robert Thomson, PE
Federal Facilities (3HW26)

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1.0 BACKGROUND

The Q-Area Drum Storage Yard (QADSY), located at the Norfolk Naval Base, was created in the early 1950s by a fill operation in the early 1950s and was used as a disposal area for dredged materials from Willoughby Bay. Currently, the site is a relatively flat fenced area, paved with crush-and-run gravel, and bounded by asphalt parking lots on the north and west.

The QADSY has been in use since the 1950s. Tens of thousands of drums have been stored there since that time. These drums contain spent solvents, oils, lubricants, paint thinners, pesticides, and acids. Throughout the site's history, the northern portion of the yard has been used to store damaged and leaking drums.

RI/FS activities began in August 1990 and continued through March 1991. The RI included surface-soil, subsurface soil, and ground-water investigations. The stated purpose of the RI was to characterize the geologic setting of the site, identify the nature and extent of contamination, and identify the impact on or threat to human health and the environment caused by that contamination. The objectives of the FS are to perform a step-by-step evaluation of remedial technologies and remedial alternatives, and select those that might be applied at the site.

2.0 GENERAL COMMENTS AND RECOMMENDATIONS

- The RI did not investigate the surface-water pathway. At a minimum, sampling results from surface-water runoff, sediment along surface-water migration routes, and surface-water targets should be included and discussed.

- In the FS report, consideration of ground-water treatment alternatives is based on incomplete information. The confining layer separating the water-table aquifer from the Yorktown Aquifer was not penetrated during the RI ground-water investigation. Also, the high concentrations of dense organic compounds dissolved in ground water that were encountered during the RI might indicate free product within the aquifer. Before a ground-water remedial system is designed, more information should be obtained on the lower confining layer and on the possible presence of dense non-aqueous phase liquids (DNAPL).

- Additional plume delineation is needed to justify any proposed remedial design, especially since the trial edge of a plume heading west was detected. If it is intended that a certain percentage of the plume not be captured by a recovery system, the risks associated with allowing continued migration of the contaminant plume must be justified.

- Investigation into the possibility that the QADSY extended farther north across Admiral Hughes Drive needs to be addressed.

3.0 SPECIFIC COMMENTS AND RECOMMENDATIONS

The following specific comments and recommendations should be addressed to ensure that the RI/FS accomplishes accurate characterization of the site and reliable evaluation of remedial alternatives.

REMEDIAL INVESTIGATION

Geologic and Hydrogeologic Assessment Results, Pages 2 and 3

not anticipating DNAPLS

1. The RI report states that a confining layer is thought to exist between the water-table aquifer in the Columbia Group (characterized by gravels, sands, silts, and clays) and the underlying Yorktown Formation (characterized by gravels and thick shell beds). The report specifically states, however, that this confining layer was not encountered during the investigation and could be absent or could be beyond the depth of the exploratory borings. As stated above, contaminants of concern at this site might have resulted in DNAPL contamination. If released in sufficient quantity, the DNAPL could have migrated downward until its flow was impeded by a low-permeability boundary such as a clay layer. The migration of accumulated DNAPL would be governed by the slope of the clay layer; thus, DNAPL could migrate in a direction different from the determined direction of ground-water flow. To meet the stated objectives of the RI, this confining layer should be characterized.

2. The report states that the water-table aquifer beneath the QADSY (within the Columbia Group) varies in thickness from 20 to 50 feet, and exhibits an average horizontal hydraulic gradient of 0.0008 feet per foot (ft/ft), an average hydraulic conductivity of 82 gallons per day per square foot (gpd/ft^2), a tranmissivity of 4049 feet per day (incorrect units used in the RI report are discussed in a subsequent comment), and a specific yield of 0.0317. This summary of the aquifer characteristics is misleading for the following reasons.

- As stated in comment 1 above, no confining layer was encountered during the RI; therefore, the conclusions regarding the 20-to 50-foot thickness of the aquifer are unsubstantiated. Such unsubstantiated conclusions in turn might have led to erroneous calculations and conclusions throughout the RI report.

- The report indicates that stated hydraulic gradient was calculated from measurements taken from the October 1990 and January 1991 ground-water elevation contour maps. Measurements from the March 1991 ground-water contour map reveal a horizontal hydraulic gradient of approximately 0.0004 ft/ft, half of the 0.0008 ft/ft value stated in the RI report.

In addition, the summary does not discuss the vertical hydraulic gradient beneath the QADSY. According to the RI/FS report, the vertical gradient ranged from 0.006 to 0.023 downward, with an average of 0.015. The report does, however, indicate that, according to measurements taken on October 17, 1990, an upward gradient of -0.004 existed at the site. If the vertical gradient of 0.015 is accurate, the downward ground-water flow component would dominate the horizontal flow component.

include data 10 yr.

Significant variations in both horizontal and vertical hydraulic gradients were stated in the RI/FS report. These variations probably are due to tidal and precipitation recharge influences on ground-water flow; however, no conclusive investigation of the these influences on ground-water flow was performed during the RI. Continuous water-level monitoring of key monitoring wells should be conducted for at least one complete lunar cycle to define the tidal and recharge influences on the rate and direction of ground-water flow. These measurements could be used to determine a net direction and rate of ground-water flow that is more accurate than the average values stated in the RI/FS report.

- The average hydraulic conductivity of 82 gpd/ft^2 was derived from the slug test data, although, on page 2-6, the report states that a constant-rate pumping test is the most valuable tool to determine an aquifer's characteristics. Such a pumping test was performed during the RI. It resulted in a calculated transmissivity (T) of 1861 feet per day, a hydraulic conductivity (K) of 178 gpd/ft^2, and a specific yield of 0.0317. The RI/FS report states that the specific yield value does appear to be representative of the aquifer but that the K and T values are higher than expected.

  The K values derived from a slug test are applicable only to the part of the aquifer immediately adjacent to the well screen and gravel pack and also are strongly influenced by the drilling techniques and well construction. Because the cone of depression created during a pumping test encompasses a much greater portion of the aquifer, the aquifer characteristics derived from the pumping test are thought to be more representative and therefore more reliable than those obtained from slug tests. The hydraulic conductivity of the aquifer will significantly influence the design of a ground-water remediation program. For this reason, the report should provide a more convincing explanation for the use of K values from the slug tests rather than the value obtained from the pumping test for remedial design. In addition, the differences between vertical and horizontal hydraulic conductivities should be presented to account for the predominant plume migration pathways. This is particularly important because the RI reports a vertical hydraulic gradient that exceeds the horizontal gradient.

- The dimensions, feet/day, associated with the T values presented in the RI report are not correct. Transmissivity is a product of the hydraulic conductivity multiplied by the aquifer

thickness and has dimensions of length^2/time (commonly feet^2/day). Furthermore, multiplying the reported K value of 82 gpd/ft^2 (equal to 10.99 feet per day) by the thickness of the water-table aquifer of 50 feet (assumed in the RI report) equals 549.5 ft^2/day. This calculated T value does not match the 4049 value stated in the RI report. Further justification of the reported T value should be submitted.

Contaminant Evaluation Results, Pages 3-6

3. The RI goal of determining the nature and extent of contamination has not been met. Neither the horizontal nor the vertical extent of the ground-water contamination plume has been delineated, as can be seen in figures 4-6 through 4-26. Furthermore, much of the vertical plume delineation was accomplished by collecting water samples at two different depths in the same screen of a monitoring well. Although this method can afford a rough approximation of vertical distribution of contaminants, the potential for mixing contaminants in the length of the well screen detracts from the reliability of this technique.

Computer Modeling, Page 5-17

4. The two-dimensional ground-water modeling exercise described in the RI/FS report was conducted for the water-table aquifer. Because modeling results are related to the accuracy of the data input, the deficiencies identified in previous comments pertaining to the geologic and hydrogeologic characterization of the site will affect the ground-water capture zones predicted by the model. As stated in the recommendation section of the RI/FS report, additional modeling should be conducted for the design of a ground-water extraction system when a more thorough characterization of the site has been completed.

Risk Assessment Review, Page 6-5

5. The last paragraph on this page states that "ingestion of contaminated ground-water would only be a problem if a usable aquifer at greater depths was affected. The soil borings did not identify a distinct lower water bearing unit, but they only penetrated a maximum depth of 45 feet." To make a more accurate risk assessment, the impact of the QADSY on the next lower aquifer (the Yorktown Aquifer) should be studied. In addition, the targets associated with the aquifer should be identified.

FEASIBILITY STUDY

Individual Analysis of Ground-water Alternatives, pages 10-15 through 10-27

6. The RI failed to quantify factors crucial to the evaluation of ground-water remedial alternatives. These factors include aquifer thickness, the extent of the contamination plume, the characteristics of the lower confining layer, variations in hydraulic gradients, the accuracy of derived hydraulic conductivity, and the possibility of DNAPL being present. The feasibility of the various ground-water remedial alternatives should be reevaluated when issues raised in these comments have been answered to EPA's satisfaction.

4.0 CONCLUSION

The RI/FS report is incomplete. Sampling results associated with the surface-water pathway should be included and discussed. Basic parameters associated with the ground-water pathway, such as aquifer thickness, the characteristics of the lower confining layer, the extent of the plume, tidal and precipitation effects on hydraulic gradients, and the potential for DNAPL on site, are not yet determined. Without this information, the modeling and remedial alternative evaluation performed during the RI/FS might have yielded misleading results. These parameters must be determined prior to evaluating the feasibility of remedial actions.

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January 23, 1992

Mr. Kenneth Walker
Atlantic Division Naval Facilities
Engineering Command
Code 1822
Norfolk Naval Base
Norfolk, VA 23511-6287

Dear Mr. Walker:

This letter is a follow up to the December 18, 1991, TRC meeting concerning several Defense Environmental Restoration Program sites at the Norfolk Naval Base.

Q Area Drum Storage Area

This area apparently contains dredged spoil from Willoughby Bay. Similar spoil material has been deposited at other areas of the installation. It is possible that the spoil itself has some environmental impact in the area of the installation. Therefore, it would be helpful to have "background" samples from areas where the spoil is known to have been used as fill and that are relatively free of other sources of contamination.

We understand that this area was used for storage of raw materials, not waste. However, if remediation involves picking up soil, it could generate hazardous waste under both federal and state hazardous waste regulations--specifically the soil contaminated by spills of materials considered U and P listed wastes. Section 261.33 of the federal RCRA regulations enumerates hazardous wastes and includes contaminated soil, water, or debris resulting from cleanup of a spill of any commercial chemical product with the generic name of the P and U listed wastes. Section 3.10.D.4. of the Department's Hazardous Waste Management Regulations contains language very similar to the federal regulation. The fact that soil or water is contaminated with material which contains a P or a U listed waste may preclude some treatment and disposal options discussed in the Feasibility Study unless

it is delisted. Picking up hazardous waste, treating it, and redepositing it in the area it came from or in another unit at the site may be considered "placement" under the EPA's land disposal restrictions and, so, may be prohibited without delisting. If we can be of any help to you in asking for EPA guidance in this matter, please let us know. If the soil is treated and delisted, before backfilling can occur it would also have to be approved in accordance with the Department's solid waste regulations.

Total metals analysis in the soil at this site has not yet been conducted. Several metals in groundwater samples from wells SW- 2, -4, and -5 exceeded Virginia State Water Control Board (SWCB) groundwater standards. We request that testing soil for total Target Analyte List metals be done at this site, particularly in the area where metals were found in the groundwater.

The report mentions stormwater conduits at the southern periphery of the site. We request that the additional field work include sampling sediment in the conduits and, if possible, rainfall runoff from the site entering the conduits and testing for the Target Compound and Target Analyte lists.

In assessing water quality, in the case of inorganics, the report compares groundwater to SWCB groundwater standards. In the case of organics, test results are evaluated against proposed surface water standards that are human health protection numbers for surface waters not used as public water supplies. The impact of groundwater quality on surface water is a valid consideration at this site so we recommend continuing including the discussion of these proposed surface water standards in assessment of the site. We recommend that on page 9-2 , wording to the effect of "the protection of human health and the environment from the discharge of groundwater to surface water" be added to the discussion of the objectives for groundwater in section 9.1.1. of the feasibility study and that something to the effect of "and preventing the discharge of contaminants in surface runoff to surface water" be added to Section 9.1.2.

MCLs for organics are also valid to use in assessing groundwater quality and the risks to human health that the site might pose. The report states that the shallow water table aquifer in this area is not used for drinking water in this area. If future groundwater sampling locates the deeper Yorktown aquifer and finds contamination, the risk assessment should discuss the effect water quality at this site might have on the areas where the Yorktown is or has the actual potential for being used as a source of drinking water. Gene Siudyla, a geologist at the SWCB's Tidewater Office, should be of help on this issue. He can be contacted at (804) 552-1840.

Table H-1 listed "regulatory levels" for several chemicals. Some of the levels were those previously proposed by the SWCB but which never became effective. We understand that the SWCB

will shortly be proposing extensive amendments to its standards. The SWCB's staff has suggested using those standards proposed by EPA in the November 19, 1991, Federal Register in the interim. Based on these numbers, the regulatory level for tetrachloroethene (PCE) in Table H-1 would be 8.85µg/l. We will be following the SWCB's standards adoption process and will try to let you know when amendments are adopted.

Page 3-1 mentions that some of the concrete slabs and wooden frames used in drum storage were stained. If they are still at the site, their potential as a continuing source of contamination and their removal should be evaluated.

The discharge of treated groundwater to the Naval Base industrial wastewater treatment plant and the treatment of organic contaminants by biological processes at the plant was discussed in the Feasibility Study. We understand that the plant is a chemical/physical plant. Will biological treatment occur here also? The plant discharges to the Hampton Roads Sanitation District (HRSD). HRSD should be contacted to ensure that it will accept treated groundwater for this option to be seriously considered.

Community acceptance is mentioned in the Feasibility Study's discussion of evaluation criteria. We feel that community acceptance is an appropriate criterion for the Q area site. Many of the options for remedial action could be of interest to area residents even if the site is farther from residential areas than some of the other sites.

In the discussion of ARARs in Appendix H, we feel the SWCB's water quality standards are applicable, not "to be considered" guidelines. They are duly adopted state regulations that apply to waters of the Commonwealth. (Although we think the standards are applicable, we understand that some of the groundwater standards will not necessarily be cleanup levels.)

LP-20 Air Craft Engine Maintenance Facility

Page 4-12 states that there is no ground water standard for silver in the state. The standard is *zero*.

The report mentions that industrial sewer lines might be a possible source of contaminant release to the environment at this site. Would something like smoke testing of sewer lines here be of any benefit?

The report recommends installation of additional monitoring wells. One of these, well DW-3, which will be drilled to the uppermost permeable horizon of the Yorktown aquifer, is in an area where there was substantial volatile organic contamination in groundwater. We normally do not encourage installation of wells into lower aquifers through areas of substantial contamination to avoid the possibility of carrying contaminants into uncontaminated aquifers. If a deep well is

installed in the area of SW-3, we request that procedures to minimize the possibility of cross contamination be used.

CD Landfill

It appears from the information we have that the permitted section of the CD landfill operated until 1987 and has not been closed. If this is the case, the landfill--or at least the section that operated from 1979 to 1987--will need formal closure under Department regulations.

Information that has been provided on the operation of the landfill has raised the question of whether it received regulated hazardous waste while it was operating and therefore must be closed as a hazardous waste landfill under the Department's hazardous waste regulations. The sandblast grit disposed of in the landfill until 1981 was found to be a characteristic hazardous waste for cadmium by the EP toxicity procedure; the rice hulls, which were also classified as characteristic hazardous waste, were deposited on the surface of the landfill until 1983. Our staff is currently evaluating this matter and may be contacting you for further information.

If closure of the permitted section of the landfill is required, our regulations governing both solid and hazardous waste landfills will require implementation of a specific groundwater monitoring program. Between 1974 and 1979 the older section of the landfill received an estimated 8,500 tons of ash that during one test was found to exceed EP tox limits for cadmium and lead, indicating that closure as a hazardous waste facility might be appropriate. In view of these points, would you consider closure of the entire landfill now, in lieu of further investigation of this site under CERCLA.

If you would like to discuss closure of the CD landfill or have any questions about our comments on the reports, please call me at (804) 371-8713.

Sincerely,

Anne M. Field

Anne M. Field

AMF/rw

cc: Cheryl Barnett
Nina Johnson
Hassan Vakili
Howard Freeland
K.C. Das